

REMARKS

Claims 17-33 have been canceled to allow prosecution of claims 1-16. No new matter has been added.

THE PRIOR ART REJECTION FROM THE PARENT PROSECUTION

In the Office Action dated April 11, 2003, of the parent Application for the above claims, the Examiner alleged that US Patent US Patent 6,165,696 to Yang et al. anticipates claims 14 and 15, and, in combination with US Patent 6,200,888 to Ito et al., US Patent 6,383,907 to Hasegawa et al., and US Patent 6,225,626 to Talbot et al., renders obvious claims 1-13, 16, 18, 19, and 22-27.

In order to expedite prosecution, Applicant places on record the following argument that was denied entry by the Examiner in the Advisory Action dated May 30, 2003, for the parent Application.

The Examiner concedes that Yang fails to teach or suggest an ion-milling procedure be done on an underlying conductor 60 covered by conductive ARC layer 62 (e.g., see Figure 4). To overcome this deficiency, the Examiner relies on Ito and alleges that it would have been obvious to one of ordinary skill in the art to modify Yang to incorporate an ion-milling procedure, as taught in Ito, "... because it will help to remove the naturally oxidized film on the conductive layer."

There are at least three problems with the rejection currently of record.

First, one of ordinary skill in the art would readily recognize that Ito is taken out of context relative to Yang. That is, Ito specifically addresses a manufacturing sequence in which a metal conductor 12 (see Figure 1A) is intentionally left exposed by via 26 for subsequent wire bonding, thereby allowing a natural oxide film to develop on the surface of conductor 12 (column 1 at lines 46-56).

In contrast, Yang does not share this problem identified in Ito. That is, in Yang, the conductor 60 is covered by ARC layer 62 and, therefore, is never exposed during formation of via 140 to allow an oxide layer to form on the upper surface of conductor 60 (see figures 13 and 14). Indeed, at lines 45-50 of column 6, Yang expressly teaches that there is no need to expose the conductor 60 in order to make electrical contact thereto. Therefore, there is no

oxide layer on conductor 60 in Yang that requires an ion-milling process to eliminate.

Second, Yang can only be reasonably described as actually teaching against the combination urged by the Examiner in that, according to lines 42-58 of column 9, an RIE is preferably used to etch the organic dielectric layer 66. In lines 51-54 of column 6, Yang expressly teaches that the ARC layer 62 serves to protect the underlying metal 60 during the dielectric etch. The Examiner cannot simply ignore the express contrary teaching of the primary reference itself. (see, e.g., MPEP 2143.01: “Where the teachings of two or more prior art references conflict, the examiner must weigh the power of each reference to suggest solutions to one of ordinary skill in the art, considering the degree to which one reference might accurately discredit another.” “The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.” “If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.” “If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious.”)

Third, even if Ito were to be combined with Yang, the result would still fail to teach the present invention. That is, the ion-milling procedure in Ito is done only to the oxide layer F formed on the top of the surface of conductor 12. There is no suggestion whatsoever in Ito to perform an ion-milling procedure on the conductor itself. Removal of a surface oxide layer by an RIE procedure does not cause the contamination of the dielectric that occurs if the metal itself undergoes an ion-milling procedure.

In contrast, the present invention teaches that an ion-milling procedure that, for example, cuts through or adds metal to the conductor can be done if the dielectric material directly adjacent to the conductor to be modified is first removed to preclude contamination during the ion-milling procedure. Neither Ito nor Yang teaches, suggests, or even hints at this procedure of first removing adjacent dielectric material prior to conducting the ion-milling modification to the conductor.

The rejection of record introduces Hasegawa to demonstrate that nitride is known in the art as a masking layer and introduces Talbot to demonstrate details of FIB milling. Even

assuming, *arguendo*, the Examiner's allegations for these two references, neither of them overcomes the deficiency identified above for Yang and Ito.

A key aspect of the present invention is that it provides a method that allows a conductor embedded in an organic dielectric layer to be modified by an ion-milling process. No method is known currently that allows reworking by ion-milling of metal conductors embedded in organic dielectric material. Such ion-milling is well known in the art to cause ions to become implanted in the organic material in the area of the ion-milling operation, thereby potentially causing shorts for conductive regions located in the area of the repair.

The present invention solves this problem by removing the organic dielectric prior to the ion-milling step. After the ion-milling is complete, the volume occupied by the removed organic dielectric material is filled in with a dielectric, typically SiO₂. The present invention provides the advantage that faults or design errors can now be modified for chips having metal conductors embedded in an organic dielectric layer.

Hence, turning to the clear language of the claims, there is no teaching or suggestion of " ... performing an ion-milling process on said conductor," as required by claim 1. The remaining independent claims have similar language.

For the reason stated above, the claimed invention is fully patentable over the cited references.

Further, the other prior art of record has been reviewed, but it too, even in combination with Yang, Ito, Hasegawa, or Talbot, fails to teach or suggest the claimed invention.

FORMAL MATTERS AND CONCLUSION

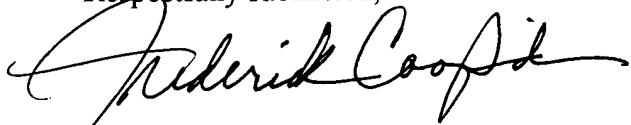
In view of the foregoing, Applicant submits that claims 1-16, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

Early and favorable prosecution on the merits is respectfully requested.

Please charge any deficiencies in fees and credit any overpayment of fees to Assignee's
Deposit Account No. 09-0458.

Respectfully submitted,



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